MAIS 202 Project Deliverable 1

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Note: Sorry for the document that's longer than a page. It's still not a lot of text and I was trying to learn Latex.

1. Datasets

I plan on using the Google Scraped Image Dataset [1] and the Best Artworks of All Time Dataset [2], both from Kaggle. They have been used by other people who made Style Transfer projects, so I am hoping that they will be quite usable. Another potential dataset will be the Painters by numbers dataset [3], used for the Kaggle competition of the same name. With the two latter datasets, I will have enough painting samples of famous artists to train the model properly. The Google Scraped Images will be the basis images for the style transfer.

2. Methodology

Preprocessing

The best artworks of all time dataset has all the paintings as .jpg files, with the titles as their artist's full name and a painting id (i.e. Camille_Pissarro_1.jpg). The Painters by numbers dataset has a separate .csv file with all painting metadata and references to the filename in one column. I am unsure on how to parse the second dataset, but extracting artist names from the titles in the first will be doable. I still need to figure out if the images need to be preprocessed. The Google Scraped Images data will not need to be preprocessed, since they are not part of a style.

Machine Learning Model

This model should generate a styled image from a sample picture. For this, I will use a Convolutional Neural Network to learn the tropes of several styles (by grouping the paintings by artist). I plan on using a model that is pre-trained on image recognition to facilitate complex image processing (probably VGG16 or VGG19 [4], as I have seen several projects using them for style transfer). It seems to be possible to use a single style image per content image, but I am interested in trying to extract styles common to a single artist.

Evaluation Metric

From some preliminary readings, I understand that for style transfer, a model needs to differentiate between the content and the style of an image, to combine the style from one image with the content from another. However, I do not see what kind of evaluation metric can be used here, as the model's performance is purely aesthetic and it does not need to predict any value. In their 2018 literature review, Haochen Li states that: "Since determining quality of images is a largely subjective task, most of evaluations of neural style transfer algorithms are qualitative. The most common approach is to qualitatively compare outputs of some current approach with some previous approaches by putting outputs of different algorithms side by side. [...] Another common evaluation method is user study." [5]

Final conceptualization

A simple webapp where the user is prompted to pick an image or upload one to style it in a specific artist's style, or an invitation for artists to upload their own drawings for them to be transformed into classic artists' imitations. I wanted to get into web design during the summer, so I will try to make a fun and engaging design.

3. Bibliography

[1] Debadri Dutta. *Google Scraped Image Dataset*. URL: https://www.kaggle.com/duttadebadri/image-classification. (accessed: 5 October 2020).

[2] Icaro. *Best Artworks of All Time*. URL: https://www.kaggle.com/ikarus777/best-artworks-of-all-time. (accessed: 5 October 2020).

[3] Kaggle. *Painter by Numbers*. URL: https://www.kaggle.com/c/painter-by-numbers/data. (accessed: 5 October 2020).

[4] Keras. *Keras Applications*. URL: https://keras.io/api/applications/. (accessed: 5 October 2020).

[5] Haochen Li. "A Literature Review of Neural Style Transfer". 2018. URL: https://www.cs.princeton.edu/courses/archive/spring18/cos598B/public/projects/LiteratureReview/COS598B_spr2018_NeuralStyleTransfer.pdf. (accessed: 5 October 2020).